

Zodiac and the Avon Legend

Air Cruisers, Avon, Metzler, MilPro Inflatables, Sevylor & Zodiac

By Herm Hoops ~ 2015

When ocean explorer and diver Jacques-Yves Cousteau sailed his Zodiac inflatable across the Atlantic Ocean in 1952 the world took notice and a new age of inflatables emerged. Zodiac, a French company, took control of several inflatable manufacturers over the years, including the British company Avon in 1998. At one time Avon river boats were considered the Cadillac of river running craft(29) “Since 1959, Avon Inflatables Limited has produced more than 200,000 inflatables and rigid inflatable boats (RIB). Recognized as a pioneer and a world leader, Avon has an enviable reputation for design, performance and exceptional product quality.”(1) In 1981 Zodiac purchased the Sevylor Company of France and in 1997 Air Cruisers, the company that made Amos Burg’s “Charlie,” became a subsidiary of Zodiac. In the 1980s Zodiac took control of the failing Metzler Company of Germany. The factories were sold to Grabner Sports and Zodiac divested itself of Metzler in 2000. Who maintained control of the inflatable patents of Metzler is an unanswered question.(#1.) In 1990, Zodiac set up MILPRO, an inflatable team focused on sales to the Military and recreational markets, with production facilities in Spain, Canada and the UK, and more recently in South Carolina.

ZODIAC

Zodiac was born out of the world's earliest aviators, as the dream of flying became a reality toward the end of the 19th century. Hot-air ballooning remained primarily an adventurer's pastime in France in the late 1870s, when Maurice Mallet took his first balloon flight. Mallet became friends with one of the country's most well-known balloonists, Paul Jovis, and together Mallet and Jovis founded the Union Aeronautique de France to develop new ballooning and aeronautics techniques and equipment. Mallet took over the flying of the association's balloons after Jovis' death in 1891 and became world-renowned when he broke the record for the longest balloon flight, flying from Paris to Walhen, Germany, over three days in 1892.(21)

The company was renamed Ateliers de Constructions Aeronautiques Maurice Mallet in 1899. In 1909 the company again changed its name to Société Franccedilse des Ballons Dirigeables et d'Aviation Zodiac and built its first biplane.(21) In 1934 Pierre Debrouette, engineer for what would later become Zodiac, designed an inflatable kayak. In 1937 he designed the now traditional U-Shaped inflatable so commonly identified with Zodiac. It was the first boat of its kind to gain certification from the French Navy. A wooden transom was patented (August 10, 1943) in 1943 to accommodate a motor on the Debrouette style boats built by Zodiac.(2) By 1953 the company began manufacturing lifeboats. In 1964 they opened their first foreign subsidiary, Zodiac Espanola S.A. in Spain, and in 1965 the company simplified its name to Zodiac S.A.(21)

{Numbers in parenthesis (1) are REFERENCES; letters in parenthesis (#a) are described in SIGNIFICANT NOTES.}

In the 1950s, French Navy officer and biologist Alain Bombard was the first to combine the outboard engine, a rigid floor and a boat shaped inflatable. The former airplane manufacturer Zodiac built the boat and a friend of Bombard, diver Jacques-Yves Cousteau, began to use it after Bombard sailed his inflatable across the Atlantic Ocean in 1952.

Cousteau liked the shallow draft and performance of the Zodiac and he used them as tenders on his expeditions. The new inflatable boats were so successful that Zodiac lacked the manufacturing capacity to satisfy demand. In the early 1960s, Zodiac licensed production to a dozen companies in other countries. In the 1960s, the British company Humber began mass production of Zodiac brand inflatable boats. The Zodiac inflatable boat, grew to be popular with the military and contributed significantly to the rise of the civilian inflatable boat industry, both in Europe and in the United States.(2)

The downturn of the world economy following the Oil Embargo of 1973 nearly brought Zodiac to bankruptcy. As the company's focus had increasingly narrowed around its boating products it was especially hard hit by the high cost of fabric and collapse of the leisure market. Recognizing the need to take the company into new directions in 1973, Zodiac brought in a new management team led by Jean-Louis Gerondeau. Gerondeau initially sought to diversify the company into other sports leisure categories building on the Zodiac brand name, while protecting itself from the seasonal nature of its core boating market. The company proved unable to find a suitable acquisition target, however, and instead placed its efforts into enhancing its international network. In 1977, the company established a Greek subsidiary, Zodiac Hellas, following that with Italy in 1978, through Zodiac Italia, and then Germany, with the opening of its Zodiac Deutschland subsidiary in 1979. Throughout the late 1900s Zodiac continued its diversification in aeronautics, automotive and other areas.(21)

AVON INFLATABLES

Avon Inflatables began in Bradford on Avon, UK in the late 1800s. In 1885 E. G. Browne and J. C. Margetson acquired a cloth mill, known as Avon Mill, on the banks of the River Avon at Limpley Stoke, UK. The previous owners of the mill had been timber merchants, but diversified into the production of rubber goods. By 1890 the business transferred to Melksham in Wiltshire. Products at this time included solid rubber tires, conveyor belts and components for railways. By 1900 pneumatic tires for bicycles were being produced, and by 1906 the first car tires were manufactured. In 1915 the company acquired Greenland Mill in Bradford on Avon (Wiltshire). The company was floated on the London Stock Exchange in 1915.(5)

In 1956 the rival company of George Spencer Moulton (founded in 1848) was acquired, including Abbey Mills and Kingston Mills in Bradford on Avon, and a jointly owned plant in Paris. In 1959 production started on a range of inflatable boats. Avon Inflatables moved to its current location in Dafen near the town of Llanelli, South Wales, UK in the early 1960s. In 1994 the Llanelli-based marine business Avon Inflatables, Ltd. was split-off and sold to Zodiac. Since 1998 the company has been a division of France's Zodiac Marine.(5)

In 1997 the Avon Tire business was sold to Cooper Tire & Rubber Company of Findlay, Ohio, leaving the company to concentrate on its core businesses of automotive components, technical products and protective equipment. Cooper Tires remains a major employer in central Melksham, UK.(5)

In March 2000, Avon consolidated its activities at a state-of-the-art manufacturing facility at Semington, and a polymer mixing center at Westbury, UK. As of January 2008, around 350 people worked at the two sites. In June 2005, Avon purchased International Safety Instruments, Inc. (ISI), based in Lawrenceville, GA USA. Avon-ISI is a manufacturer of SCBA, APR, and Thermal Imaging Systems for fire, law enforcement and industrial applications.(5)

In August 2006, the Avon Automotive division was sold to a US-based management team and became a separate entity called Avon Automotive Holdings Inc. This was the largest single buy out in the company's history. Its aerosol division was sold to Crosslinks Ltd. in March 2008, enabling the organization to concentrate on its core protective equipment, dairy and extrusions markets. In November 2008, the mixing plant at Westbury, UK was sold to ATR Compounding Ltd., a division of SPC UK, a manufacturer of rubber based fabrics in Whitby.(1,5)

Avon inflatables, which carried the logo "Safe as the Ark," were recognized as 'the' product to own in the recreational inflatable boating and life-saving industry. Avon inflatables have unrivaled design and go through rigorous sea trials. The Avon "package" is thorough, from the hull design to carrying capacity, outstanding handling, buoyancy and seaworthiness. "As testament to the product quality, Avon's Liferaft range has had more successful rescues than any other brand, including the longest Liferaft survival in history, an impressive 117 days."(1)

The first inflatable boat products Avon manufactured were a range of four Dinghies: the Redstart, Redcrest (both still produced today) and the larger Redseal and Redshank. The UK and USA markets were the target markets aimed at the yachting sector, where safety and portability were important. Avon quickly became a market leader and progressively expanded the range of inflatable boats. In 1966 they launched a range of 4, 6 and 8 man life rafts. In 1970, Avon in conjunction with Atlantic College, Wales, developed the first hybrid rigid inflatable, and in 1971 launched the first Avon Searider RIB, a sea-going boat still in manufacture today.(1)

Initially Avon inflatables sold through four distributors in the United States. From the Redstart Dinghy to the Searider Rigid Hull Craft, Avon offered a wide variety of water craft covering all aspects of leisure, commercial, rescue and defense needs. Avons are used by many of the world's major Navies, Rescue Organizations such as the Royal National Lifeboat Institution in the UK, the United States Coast Guard, commercial operators and environmental organizations like Greenpeace.(1) Avon has been long associated with epic explorers such as Colonel John Blashford Snell, Sir Francis Chichester and other marine luminaries.(5)

Avon was not producing rafts specific to whitewater use when Campways began selling whitewater rafts. The Avon Redshank and Redstart were designed as yacht tenders, they had a slight lift to their bow, but the stern was flat and squared for a motor. Although the Avon rafts were small for commercial river use a few outfitters and some private white water rafters used them.(31,40)(#e.)

Around 1969 Avon entered the white water river market at the request of Lou Elliot, who founded the American River Touring Association (ARTA). Elliot and designer Eddie Snowden developed two river boats, the Adventurer and Professional, based on Elliot's river experience. When the first batch of boats arrived Elliot wasn't happy, he was used to the heavy military assault boats and Ron Smith's Green River rafts. The Avon pro weighed 125 pounds!(20) By 1971 Avon was a pioneer of white water rafting, and producing inflatables for commercial and private river runners in the United States, but they were expensive.(1,2)(#k.)

In 1971 the Craighead Brothers, in Jackson, Wyoming began using the Avon Adventurer but their size limited the number of passengers and gear for outfitting multi-day river trips.(2,27)(#c.) B.A. Hanten commercially outfitted on the Rogue River in Oregon for over forty years. By the early 90's the competition was intense from new manufacturers.(4) B.A. had a lot of other irons in the fire with the lodge and outfitting business, so he decided to quit and liquidate Rogue Inflatables in 1991. "Then I ran out of boats for my outfitting business and split a 60 boat (Avon) order with Jerry Briggs in the mid to late 90's that we used and then sold as used boats." "We called them our tissue paper boats."(3) The Avon's certainly were lighter than the Rogue Inflatable models that Hanten designed and had built by Rubber Fabricators in West Virginia and the Toyo Rubber Company in Japan.(32)

Because Avon inflatables were manufactured in England, the import tariff added to their expense. Before the production of specific whitewater models the Avon Redshanks, Redcrests and others had rubber motor mounts on their stern. In a curious twist of import tariff regulations, because they had the motor mounts they paid a lower import duty.(29,30,31)

Avon inflatables conform to the requirements of ISO 6185, USA/H28, and British Standard MA16 and all Avon craft conform to the Essential Safety Requirements of the new Recreation Craft Directive No. 94/25/EC and are CE marked. Avon uses fabric made by Aerazur, a Hypalon®(#f.) coated polyester high tenacity base fabric, a coating of Polychloroprene CR. The fabric produces a strong craft that is wear resistant, waterproof, and virtually unaffected by weather, petroleum, sunlight and abrasion. The polyester base fabric is less sensitive to stretch and requires skill in the assembly process. The result is a stiffer, responsive boat that performs and tracks better than other Hypalon™ boats. It eliminates the need for heavy wrap-up floors thus making lighter boats that are more portable and easier to launch, row or paddle.(8) Avon tubes are designed to operate at 2.5 p.s.i. although they were factory tested to 11 p.s.i.(22) They use high quality adhesives, in the cold-adhesive process and buoyancy tubes are all internally seamed.(1) For a short time the early Avon pro and Adventurer models had a neoprene sponge floor sandwiched between Hypalon, that was quickly discarded and replaced by a nylon/Hypalon coated product.(20) In 1985 Avon tested a standard Adventurer with a self-bailing floor that was in production by 1986.

Avon began litigation against Campways and Dan Baxter for copying the Avon self-bailing floor. They wanted Baxter to pull all of his self-bailing boats off the market and stop production. Baxter went to Hyside, Demaree Inflatable Boats (DIB) and other American raft and explained to them that if Avon was successful against him they could be successful against them. Most helped with information for Baxter’s defense, and Hyside and DIB even sent prototypes with documentation about their inflatable, self-bailing floor design. During the patent searches the lawyers found a self-bailing kayak that was designed in Germany with photos and drawings from 1896. Dan said: “My lawyers went through Avon's applications for patenting the self-bailing floor.”(26) All Avon patent infringement claims were eventually rejected. “Avon had a patent claiming their thwarts pushed down on the inflatable floor to keep it from rising. Since we had thwarts smaller in diameter that didn't touch the floor the lawsuit was tossed out.” Baxter said: “One of the claims that was thrown out, was the use of stainless steel grommets around the floor. The lawsuit made me look at why we used grommets. They could get bent and cut the boat. So I simply ran a strip of thick gum rubber around the edge and punched holes for self-bailing.(26)

In 2010 Avon replaced the entire bottom of their Special Edition boats with 40oz. 1100 denier polyurethane fabric. This 80% Hypalon/Polyester Core has the Hypalon calendared, not sprayed on the base.(#j.) It helps a raft slide over rocks and is tear resistant, stiffer, and lighter than most fabrics. The common Avon color is light gray but custom colors are available on a special order basis.(#g.) The inflatable, self-bailing I-Beam style floor was permanently attached. A Chafe strip protected floors, tube sides and tops. The boats had heavy duty side lift handles, high-impact nylon bow S-ring lift handles, reinforced stainless steel D-rings, and an Avon exclusive system of thwart attachment that makes it possible to attach and detach thwarts quickly. Avon used low profile leaffield A-7 valves with a secondary seal built into the cap and an Avon produced pressure relief valve on inflatable floors.(1,5,6) Avon rafts came with a 10-year fabric and 5 year seam warranty.

Model Specifications: (circa 2010 except Redshank)

	<u>LENGTH</u>	<u>BEAM</u>	<u>TUBE</u>	<u># OF</u>	<u>WT.</u>	<u>CAPACITY:</u>	<u>FABRIC</u>
			<u>DIAMETER</u>	<u>CHAMBERS</u>		<u>(POUNDS/PEOPLE)</u>	
Redshank NSB	12'	4'10"	14"	3+thwarts	52	1100/5	
Scout SB -	12'3"	5'11"	18"	3+thwarts	108	1700/5	1100 Decitex
Drifter NSB -	13'2"	5'9"	18"	3+thwarts	83	1405/6	1100 Decitex
Explorer SB -	12'3"	6'3"	19"	4+thwarts	126	1850/8	1650 Decitex
Adventurer SB -	13'9"	6'8"	21"	4+thwarts	151	2000/9	1670 Decitex
Ranger SB -	14'2"	6'6"	20"	4+thwarts	141	2000/9	1670 Decitex
Expedition SB -	14'9"	7'2"	21"***	4+thwarts	150	2300/11	1670 Decitex
Extreme SB -	15'4"	7'1"	22" tapered	3+thwarts	196	2300/11	1670 Decitex
Pathmaker SB -	12'8"	6'3"	19"***	4+thwarts	154	1698/7	1670 Decitex
Professional SB -	16'3"	7'6"	21"***	4+thwarts	162	2650/12	1670 Decitex
Spirit -	18'	8'	21"***		154	3600	
Superpro -	17'6"	8'2"	22"	4+thwarts	198	3505/16	1670 Decitex

***The length, width, tube diameter and weight of many of the Avon models have changed slightly over the years. Many models, like the Pro changed when the design went from “bucket boat” to self-bailers;

The Avon 8'2" Redstart cost around \$370 in 1973, the 9'3" Redcrest sold for \$450, and the 10'3" Redseal for \$500.(27) *Consumer Reports* recommended the Avon Redcrest in 1974. The article commented: "Inflatable boats can be taken out of a closet, carried in your car's trunk, and set up at waterside. They're virtually untippable and unsinkable. But they handle less precisely than hard-hulled boats. They can be exhausting to row."(32)

The Redshank had a pointed bow and a blunt stern and served well on rivers by experienced boaters. Redshanks came with oarlocks installed on the tubes, rub pads on the side tubes and top, lifeline, motor mount brackets, bow dodger cleats, two thwarts, a foot bellows inflation pump, repair kit and duffel style carrying case. The Redshank MKII sold for around \$575 in 1971. The following options could also be ordered: removable bow dodger, metal motor mount, varnished marine plywood floor, and six-foot oars.(14) "In 1978 Amos Burg ran his Avon Redshank through Hell's Canyon on the Snake River. The high flows and Burg's age and medical condition made the Redshank unsuitable for a river the size of the Snake."(34) Prescott College used Avon Redshanks in the early 1970s (1974).(12) (#b.) Bob Ratcliffe saw an old Redshank being rowed on the Main Salmon River a few years ago complete with the spray shield. The Redshank was a great boat to learn to raft in, always wet and exciting.(12) Even old, and often mistreated the Avon fabric remained easy to repair. They were truly durable boats.(13)

Federal and state agencies began to use Avon boats for their river patrols because of their reliability and durability.(11) The National Park Service at Dinosaur National Monument had a Redshank that they painted orange. It was an older model than the Prescott College ones as it was a bit longer and narrower.(15)(#a.) By 1995 Dinosaur National Monument had three 16' Avon Pros used for patrol, and exotic plant removal. By the late 1990s the Monument converted to Maravia Williwaws and the Avon's were surplus.(15)

The Avon Scout is a lightweight, responsive and practically an indestructible boat. In 2010 Avon replaced the entire bottom of these Special Edition boats with 40oz. polyurethane fabric. The Scout sold new for \$1,675 in 1986, in 1992 it sold for \$4,075 and \$4,325 in 2011.

The Drifter was the only non-self-bailer produced after 2010. It is a popular raft for fishing and is light weight and compact. Used Drifters were recently advertised (2012) on eBay with frame, cooler and oars for \$2,200. It sold new at Clavey River equipment for \$2,900 in the mid-2000s.

The Explorer was designed by Clavey River Equipment(8) and comes with two detachable thwarts. Its small size and short waterline make the Explorer excellent for tight technical rivers. It can carry four to six paddlers, and is a fishing rig when rigged with a rowing frame. It sold at Clavey in the mid-2000's for \$4,200 - \$4,500.

Early Adventurers had an 18" tube diameter, which was later increased to 21 inches. In 1971 the Avon Adventurer cost \$875 and by 1978 had risen to a cost of \$1,300.(2,29) Around 1995 the Adventurer began using a self-bailing floor, and for years it was the most sought after 14' self-bailer available. Two thwarts were standard with the Adventurer and there were multiple attachment points for an optional third. It is a perfect 7-person paddle boat or can be used as a gear hauler for small rivers. The Adventurer sold new for \$5,500 in 2009.

The Ranger can navigate tight, technical rivers. Similar in length to the Adventurer but 7" less on the beam, the Ranger also has smaller tubes making it ride lower in the water increasing stability. The Ranger sold new in 1994 for \$4,700.

The Expedition, designed by Clavey(8) is a foot longer than the Adventurer making the Expedition a superb oar assisted paddle boat or the perfect multi-day mid-sized family gear rig. It sold new at Clavey and AAA in Denver for \$5,995 in 2009.

The Extreme features tapered tubes, smooth angles, high bow and stern kick, distinctive qualities that make it an excellent performer in heavy water conditions. The Extreme sold for \$6,304 in 2008.

The Pathmaker is a good all-purpose raft, suitable for low water and big rapids, and sold new for \$5,347 at Clavey Paddlesport in the late 2000's.

The Avon Professional (Pro) was designed by Lou Elliott as an outfitters expedition boat to carry heavy loads. In 1999 the Moab BLM purchased an Avon Pro because of its reliability, durability and how functionally it operates in the heavy, swirly water of Westwater Canyon. For years the National Park Service used Avon Pros as patrol boats in the heavy water of Cataract Canyon. The US Fish & Wildlife Service, Colorado River Fish Recovery Project has used Avon Pro and Super Pro models since around 2000 in some of the hardest, constant use ever experienced. The boats, laden with heavy frames, generators and shocking equipment, large fish tanks, personal and work gear are rowed down the shores of rivers over rocks and other obstacles. The wear and damage are extremely minimal considering the hard use the boats endure, the only major problem has been leaking Avon valves and boots.(13,16) The River Professional MKII sold for \$1200 in 1971(2), and for \$4,595 in 1993. A used non self-bailer sold for \$600 - \$900 in 2012.(20)

The Super Pro is the largest Avon self-bailer and is designed to carry heavy cargo in big water conditions. In 1991 it sold new for \$5,495.(7) A number of Grand Canyon outfitters run 18 foot Avon Super Pros. Most of them are circa 1995. The boats run about 10 - 14 day trips per year, that's 140 days on the river each year. That calculates out to 6.1 years of on river use. Most of them are starting to show some wear as can be expected.(19)

The Spirit was designed by Vladimir Kovalik and made until around 1995. Wild Water West, which became Adrift Adventures in 1978, was a Havasu shop and they had a lot of problems with the plastic valves and the valve seats. The next year Adrift bought their first three Avon Spirits. 1979 was a fairly high-water year, and in June Adrift ran three Avon Spirits down Cataract Canyon as a triple-rig. Adrift was sold again and split up a year or so later and was pretty much an Avon shop by then.(18) Barry Hatch remembers the first Avons that Hatch River Expeditions used on the Middle Fork of the Salmon and Selway Rivers in Idaho: "My first year as a guide on the Middle Fork of the Salmon (1976) we had three Udiscos and two Avon Spirits in our fleet. The Avon's were just purchased a month or so before the Middle Fork season. They were so superior to the Udiscos that we had an entire fleet of six for the next season and we were in hog heaven."(10) The Spirit sold new for \$3,695 in 1986.

In the mid-to late 2000s the quality of Avon rafts went down. In 2006 River Runners/Adrift Adventures bought ten boats from Clavey Paddlesports and the urethane floors de-lamed, the seams failed and leaked air. Clavey replaced the boats in 2007.(39) In 2009 OARS purchased several Avon Pro boats for their Vernal, Utah operating and within a month the seam tape had loosened.(13) Clavey Paddlesports, of South Petaluma, California, was a long time distributor of Avon inflatables. In 2011 Clavey Paddlesports no longer carried Avon's because of economic conditions, and an unfavorable market along with escalating labor and raw material costs.(6) AAA Inflatables of Denver, Colorado was also an Avon distributor since 1995. AAA Inflatables no longer carries Avon rafts, because of high price, low margin, and average quality.(17)

AIR CRUISERS

Zodiac Aero Evacuation Systems (formerly known as Air Cruisers), has manufactured a range of inflatable safety products for over 75 years. Zodiac Aero Evacuation Systems is a world leader for civil aviation and one of the first companies to manufacture Evacuation Slides, Slide/Rafts, Life Rafts, Life Vests and Helicopter Emergency Flotation equipment. Their products are supported by a worldwide sales and service network and factory based engineering staff and technicians with manufacturing facilities in France, the United States and Mexico.(33)

In 1935, company founder James F. Boyle began Air Cruisers in New Jersey. Prior to World War II, Boyle invented the inflatable life jacket called the "Mae West." Initially the company made airships and thus the Air Cruisers name is directly based on that heritage product. In World War II the company focused on production of Life Preservers, Life Rafts and Barrage Balloons. Since 1987, Air Cruisers has been a subsidiary of the Zodiac Aerospace. In 2013, Air Cruisers has changed its name to Zodiac Aero Evacuation Systems to establish its presence as a member of the Zodiac Aerospace group.

In 1938 Amos Burg used a small one-person raft to float the Middle Fork of the Salmon. In 1938 Buzz Holmstrom and Amos Burg duplicated Buzz's 1937 solo trip down the Green and Colorado Rivers to make movies of his previous famed adventure. Burg's inflatable raft, named "Charlie," was the first known use of an inflatable raft on the Colorado River System. In early May 1938 Burg's benefactor, Charlie Wheeler, had arranged a meeting with a Mr. Asfall the executive vice president and of B.F. Goodrich in Akron, Ohio to build an inflatable raft for Burg. The Goodrich engineers were skeptical as no one had really developed an inflatable for whitewater use and they were unsure of how to fabricate such a boat.(23)

Goodrich agreed to provide the vulcanized rubber for the raft and directed Burg to Air Cruisers, Inc. of Bayonne, New Jersey for the boat's construction. At the time Air Cruisers manufactured life rafts and flotation devices for the United States military. At Air Cruisers Burg was met with more skepticism. They were reluctant to take on production of a small one-time project. In addition Burg had no specifications or designs of his proposed inflatable boat. After Burg convinced the company to take on the project he spent another week explaining the details of what he wanted. The 1958 fall issue of *American Whitewater* magazine estimated the cost of Burg's boat at \$1,500. The raft was approximately 16' long and 5' wide and weighed 83 pounds. "Twenty-six air tight compartments, inflated with two-and-a-half pounds of air, would allow Charlie to "float on a dew drop," boasted Burg." According to the Goodrich Company the boat could carry five thousand pounds of gear.(23)

On July 22 Air Cruisers began production of Burg's yellow boat with a promised delivery to Oregon in early August. Air Cruisers estimated the assembly and manufacture would take a week, but they immediately ran into problems from the summer heat and humidity at the factory. Burg had named his yet unseen boat the "Charlie" in honor of Charlie Weaver who had donated \$200 to the expedition. It was not until mid-August that Burg's crated boat arrived in Green River, Wyoming. After nearly a month's delay of the expedition Burg launched his untried boat, along with Buzz Holstrum's wooden boat the "Julias" at Green River Lake on the morning of August 26 to begin their journey down the Green and Colorado Rivers. In 1982 Amos Burg donated "Charlie," the first inflatable raft to be rowed through the Grand Canyon to the Utah State Historical Society, where it still resides.(23)

In 1947, after working for the National Park Service at Mesa Verde National Park, Kenny Ross took the reins of Southwest Explorations, which Ansel Hall had established a decade earlier. Inheriting a small fleet of rafts manufactured by Air Cruisers, Kenny in 1957, launched Wild Rivers Expeditions. Prior to Glen Canyon Dam and Lake Powell, between 1957 and 1963, Wild Rivers Expeditions ran many San Juan River trips to the confluence of the Colorado and then through Glen Canyon. Many of the trips began as far upstream as Shiprock, New Mexico, or at Hite near the mouth of Glen Canyon. Wild Rivers also ran many early trips on the Colorado River through Cataract Canyon before Lake Powell, where Kenny named the famous rapid "Satan's Gut." Kenny's educational orientation combined with the fun and adventure attracted a diverse and loyal following, from the National Geographic Society, the Explorer Scouts, Bluff elementary school children, museums, universities, and families from all over the world to travel down the river.

In October of 1947, Harry Aleson became interested in using World War II surplus inflatable boats for river touring. With Georgie White-Clark, the two completed a float trip from Green River, Utah to Hite Crossing, in a surplus 12 foot, 7-man neoprene inflatable manufactured by Air Cruisers. In 1948 Aleson hoped to start a touring company called Colorado Up River Expeditions at his residence in Richfield, Utah. His proposed charge for a combined float tour of the Grand Canyon and motor boat tour of Lake Mead was \$550.00. The company never materialized but in May of 1948 Aleson used surplus Air Cruiser 7-man rafts to float the Escalante River.

SEVYLOR INFLATABLES

While John Travolta was tearing up the disco scene, an outfitter named Orange Torpedoes was offering trips down the Rogue River with the original inflatable kayak built by Sevylor. Sevylor® is an inexpensive heat sealed brand of Zodiac.(25) Sevylor® products trace their origin to a small company, called Sevy, that built electrical accessories in Vitry, France in 1948. As a sideline, they stumbled on a process that allowed them to use their high-frequency welding machines to manufacture PVC goods. The invention of an inflatable bathtub, dubbed "Dou Dou," was perfect for postwar France. The inflatable tub was portable, convenient, practical, easy to clean, durable, and most of all, more affordable than its wood or metal counterparts and for a time it transformed the small company into the world's dominant supplier of PVC inflatables.(23)

Sevylor quickly outgrew the facilities in Vitry so the factory was moved to the picturesque Alsatian village of Buhl. After establishing its new headquarters, and convinced of its golden potential, the company added the letters “lor” (l’or is French for gold) to its name. The company expanded into developing valves, pumps, boats, inflatable pools and a variety of water toys.(23)

In 1929 Amos Burg took his 6' long, 12-pound raft to Alaska to run the Mackenzie, Bell, Porcupine and Yukon Rivers. The raft came with jointed oars that could be broken down and carried in a pack. “Burg wrote that his craft-made by the Sevylor Company-handled better than he expected. At the time (circa 1929) the company made small lightweight rafts for modest recreational use. The flimsy materials and construction of the boat concerned him. The rubber floor of the raft was thin and subject to rips and tears if he ran upon a snag or gravel bar. After a few hours of rowing, he noticed that his port oarlock (made of vulcanized rubber) was wearing thin. Hatchet close at hand, he ran down whichever side of the river had the largest stand of trees. He reasoned that if he had to abandon the rubber craft, he wanted to be near a source of wood to fashion a raft.”(34)

Kayak Corp. of America signed an exclusive U.S. distribution agreement with the company in 1959 selling directly to the public at sport shows and other events. From there Sevylor developed the first camping mattress that was sold by Neiman Marcus. As potential grew for PVC products, Sevylor developed a PVC that had “memory,” the ability of to return to its original shape regardless of temperature.(23)

It wasn’t until 1962 that Sevylor made inflatable history in the United States when it launched an inflatable pool mattress with a headrest and circular pockets. This design provided cushioning comfort while keeping the user cool, and when the pockets filled with water, it provided ballast to keep the mattress from wobbling. Soon after Sevylor moved into other areas of development including the Tahiti™ kayak.(23) By 1963 the Sevylor inflatable river Tahiti kayaks, none of them self-bailing came in four models from 7'8" to 12'6" long. The Tahiti was made from unreinforced PVC. The early Tahiti’s had a fatal flaw, the heat-seal floor did not hold up to whitewater conditions and often split.(36) Their Vista Model, that retailed for \$179, had a clear, see-through floor.(35)

In 1972, Sevylor France bought out Kayak Corp., and a new company called Sevylor U.S.A. Inc., was created with Conny Klimenko at its helm. This began a development of products strictly for the U.S. market.(23) The Zodiac Group, a world leader in heavy-duty inflatables for military and expedition use, took over Sevylor France and all of it’s subsidiaries in 1981. Sevylor was reorganized into two separate divisions: Sevylor International (above ground pools) and Sevylor® (leisure inflatables).(23) This move gave Sevylor and Klimenko freedom and opportunity to develop new products and new markets. The invention of the Ski Bob™ in 1986 was a turning point that lead the way in creating the towables business. In the fall of 2006, Sevylor was purchased by Stearns Inc., a subsidiary of Jarden Corporation, and known for its marine and outdoor products headquartered in St. Cloud, Minnesota. In 2008 the Coleman Company, Inc., known worldwide in the outdoor business, added Sevylor-made products.(23)

In the mid-1980s beginning paddlers could purchase a Tahiti K-69 for a little over \$100. But the company quickly developed a variety of more sturdy and sophisticated craft in the red and gray Sevytex line and classic yellow Tahiti Kaynoe which were made from a heavy-duty, rip-stop polyester fabric and cost \$300-\$528 depending on the options selected. The Tahiti K79 was for two people and the floor was reinforced to correct the previous problem.(37,38) It was 10'8" long, 2'8" wide with 9 ½ inch tubes, with 3 air chambers, Boston Valves, and weighed 23 pounds.(35,36,38) The 1-person Sevytex TX305 was 10' x 3' and weighed 32 pounds. The 11' long TX345 was for two people, both it and the 12'10" two person TX390 models were 3' wide and made of 1000 denier PVC, they had an I-beam inflatable floor, inflatable seats with backrests, Boston Valves, and had an optional spray skirt. While these models were not self-bailing they had single drain holes to let the water out of the boat.(35,36)

Today, Sevylor's innovative designs range from inflatable boats to whimsical floats and it markets different items including tenders, hunting and fishing boats, specialty boats and kayaks, towables, snow tubes, air beds, pool floats and toys, river tubes, swim and sport rings, and other accessories.(23)

MILPRO BY ZODIAC

Zodiac was a global leader in the manufacture of military and professional RIBS and inflatable boats, and their market to the United States Military was significant. Arcata, California-based Wing Inflatables had a considerable investment in and manufacture of inflatable boats and accessories for the U.S. Military made from fabrics manufactured in the United States and Bill Wing felt that foreign competition for military products was unfair and should be regulated under The Berry Amendment. The Berry Amendment is a statutory requirement that requires the Department of Defense to procure items, including fabric and its manufacturing to be produced in the United States. Congress originally passed domestic source restrictions as part of the 1941 Fifth Supplemental Department of Defense Appropriations Act in order to protect the domestic industry base in the time of war. The Berry Amendment was included in subsequent defense appropriations acts until it was made permanent in Fiscal Year 1994 by Sec. 8005 of Public Law 103-139. The Berry Amendment was subsequently codified in 2002 as 10 U.S.C. 2533a in Section 832 of Public Law 107-107.

While the Berry Amendment doesn't specifically mention "rubber boats" those boats are made from fabric and Bill Wing thought it applied to that industry. Zodiac International is a French company that makes, and wants to continue to make CRRCs for the U.S. military. Zodiac's CRRCs are made overseas from Hypalon, a Dupont fabric that is no longer manufactured in the U.S. because of environmental issues. Wing Inflatables, who uses fabrics manufactured in the United States, had been trying to get into the CRRC business and Bill Wing said: "for 15 years, and we haven't been able to because Zodiac has had it tied up. They [the DOD] should have been enforcing the Berry Amendment, and they got away without doing it." "The potential is for thousands of boats," said Wing.(24)

To circumvent the difficulties encountered by The Berry Amendment in 1990, Zodiac set up MILPRO, a team focused to the Military and Professional field, with three specific production facilities (all ISO 9001 approved) in Spain, Canada and the UK, and more recently in South Carolina (USA), each supported by experienced research and development, sales and marketing teams. As part of Zodiac's marketing strategy, they introduced Milpro river boats, essentially of Avon design.

For nearly fifty years Avon had set the quality standard for the industry. Jeff Kellogg of Clavey Paddlesports blogged: "There are a lot of choices in rafts out there, and I don't believe in bashing any of them. They all have pros and cons. Avon has been making inflatables longer than any of the other manufacturers, so if experience counts in making and designing boats, they've got it. They are made in Wales and being in the EU, the factory is subject to higher safety standards than the typical Asian factory. The fabric Avon uses is made by Aerazur, which utilizes a full Hypalon coating on the outside, with a polyester base. Other boats use a neoprene coating with Hypalon on top. An all Hypalon coating will wear longer. Avon also uses a polyurethane fabric on the floor to give the boats better wear and slide over rocks better.(9) Avon, one of the first companies to manufacture river boats, took private boaters and commercial outfitters to a new level. Their seemingly ageless boats are still a common sight on the rivers today.

Zodiac and the Zodiac "Family" of inflatables had a profound impact on river running. It was the Zodiac that brought the potential of inflatables to the forefront. Air Cruiser's "Charlie" pioneered the use of inflatables on the Colorado River, Sevylor developed the first inflatable kayak and Avon designed specific models of boats for whitewater use. This cornucopia of manufacturers ushered in an era of design and development of river craft that continues to this day.

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MISCELLANEOUS

- Avon Rubber Company Hull #AVB

- Zodiac Hull # XDC

- Sevylor Hull # ZHP

- MilPro Hull # XMP

- Air Cruisers: Air Cruisers Company, 1747 State Route 34, Wall, New Jersey 07727-3935

- Avon Inflatables Ltd: Military and Professional Division; Dafen, Llanelli; Carmarthenshire SA14 8NA - UK

-Avon Initial Distributers:

Western States: Seagull Marine Sales, 1851 McGaw Avenue, Irving, CA 92705

Eastern States: Imtra Corporation, 151 Mystic Avenue, Medford, MA 02115

Midwest States: Inland Marine Company, 79 East Jackson Street, Wilkes-Barre, PA 19701

Alaska: Alaska Marine & Equipment Company, Box 6208 Annex, Anchorage, AK 99500

- Avon: Clavey Paddlesports (Clavey River Equipment); 409 Petaluma Blvd. South Petaluma, CA 94952

- Avon & Zodiac: Outdoor Adventures, 688 Sutter Street, San Francisco, CA 94102

- AAA Inflatables Equipment & Repair, Inc.; 3264 Larimer Street, Denver, CO 80205

- Sevylor U.S.A. inc.; 4476 East Washington Boulevard, Los Angeles, CA 90023 and later 6279 East Slauson Ave., Los Angeles, CA 90040

- Zodiac of North America, Inc., 11 Lee Street, Annapolis, MD 21401

Zodiac was sold through numerous dealers.

- Zodiac (MILPRO DIV) 540 Thompson Creek Road Stevensville, MD.

RELATED:

- *"The Last Voyageur - Amos Burg and the Rivers of the West"* Vince West; Mountaineer Books; 320 Pages; ISBN: 978-1-59485-701-0; 2012; Voyages of the Imagination (1920-1929): (Great River of the West: The Columbia, The mad Snake, Down the Yukon River, Deh Cho: Canada's Mackenzie River) Beyond the Horizon (1930-1949): (Rising Star, Exotic Climes -- Land of Fire: the Tierra del Fuego and Patagonia Archipelagos, Burg's experiment: the Green and Colorado Rivers, Boatman, filmmaker, spy: the Middle Fork and main Salmon Rivers) Coming Ashore (1950-1986): (The Bering Sea and the Yukon River, The Mackenzie River revisited).
- Amos Burg Photographs, Alaska State Library Alaska State Library-Historical Collections has a number of Amos Burg photographs with his inflatable boats:
 - [Amos Burg on the Colorado River, 1938; ASL-236-12-207-1347] Source: Juneau Empire Obituary, Friday, June 13, 1986
 - [Amos Burg in inflatable raft on Colorado River, 1938; ASL-MS236-12-207-1348] Source: Juneau Empire Obituary, June 13, 1986. Photo by Mildred Capron.
- Amos Burg Photograph, University of Utah, J. Willard Marriott Library:
 - Photograph p0077n01 14 89: Burg-Holmstrom Expedition, 1938; Amos Burg and Orrin Kyle Anderson standing in front of Burg's boat "Charlie."

SIGNIFICANT NOTES:

(#a.) Dinosaur National Monument Avon Redshank

Ranger Joe Alston flipped it in Harp Rapid above Triplet Falls in 1977. Bill Ott and Bob Ratcliffe used it occasionally until 1983 when Bill tied it up at Split mountain boat ramp and left it overnight as he was going to float on to Jensen the next day. When he went to get it in the morning it was gone - stolen - and it was never seen again which was interesting because it was painted orange with "National Park Service Ranger" painted on its sides.

(#b.) Avon Redshank - Bob Ratcliffe

Wayne Van Voorhies and Bob Ratcliffe bought seven of them from Prescott College in 1976 when the first Prescott College went out of business and sold their outdoor gear. They were tough little boats and Bob rowed or paddled them down all the west's major rivers including the Grand Canyon and Cross Mountain Canyon on the Yampa in 1977. The Cross Mountain run must have been one of the early raft descents, and Bob had a rough time as it filled with water and a sharp rock tearing a 2' by 3' "L" shaped hole in the bottom. They repaired it with duck tape and rowed on. Ratcliffe kept one of the seven Redshank's for many years rowing it down numerous Northwest rivers until a fateful run on the Rogue in the 1990's when his wife to be (Sharon) was rowing one of her first trips solo and she wrapped it on a rock. Bill Ott was with them and despite their best efforts, they could not salvage it.

(#c.) Avon - John & Frank Jr. Craighead

The Craighead brothers of Jackson, WY had begun using inflatables with the U.S. Navy during WWII. They began using Avon rafts, first the Adventurer which was shown on TV in the National Geographic Society special on wild rivers. The Craigheads eventually began using the Avon Pro as the Adventurer lacked capacity for large groups of people.

(#d.) Moab BLM Avon Pro

The Avon (Serial #GBAVB16307K798) was purchased by Moab BLM in 1999. They only purchased one boat and chose Avon because they are reliable, durable fabulous boats.

(#e.) Early Hatch River Expeditions use of Avons

Barry Hatch remembers the first Avons: "My first year as a guide on the Middle Fork (1976) we had three Udiscos and two Avon Spirits." "The Avons were so superior to the Udiscos that we had an entire fleet of six Avons for the next season and we were in hog heaven. We used the Udiscos for training guides for about four or so more years. If you didn't make a good run and ran a hole, you'd get hammered, and some times thrown out of the boat."

(#f.) Hypalon®

Hypalon is a trademark for chlorosulfonated polyethylene (CSPE) synthetic rubber (CSM) noted for its resistance to chemicals, temperature extremes, and ultraviolet light. It was a product of DuPont Performance Elastomers, a subsidiary of DuPont. CSM is one of the most common materials used to make inflatable boats and folding kayaks. It is also used in roofing materials and as a surface coat material on radomes owing to its radar-transparent quality. Hypalon is also used in the construction of the decking of modern snowshoes, replacing neoprene as a lighter, stronger alternative. Hypalon has become the common name for all kinds of CSM even though DuPont was not the only manufacturer.

DuPont Performance Elastomers closed its Louisville, KY in 2006 and its plant in Beaumont, TX - its last remaining Hypalon fabric plant in 2010. The company was therefore exiting the business for Hypalon and its related product, Acsium. Other manufacturers, like Syn Kyong in Korea (Hyside) continue to produce Hypalon.

(#g.) Avon Colors

Richard Martin's Avon Super Pro was one of several made special for Dick McCallum and his company Grand Canyon Expeditions. When Dick decided to exit the Grand Canyon business in 1997 he sold his fleet and there were three brand new ones that had never even been inflated. Martin, having always been in love with Avon's, could not resist and "Orange Sunshine." has been on many rivers including the Colorado maybe 25 times.

(#h.) Avon Production issues

In 2009 Hatch/O.A.R.S. purchased 4 Avon Pros that were made in August 2008. Vernal O.A.R.S. manager Bruce Lavoie reported that the issue we had was seam tape peeling from the floor in many places on all of the boats. The floors had a polyurethane coating and it may be related to poor preparation at the factory.

(#i.) Metzler: The History of Metzler will be in a separate document.

(#j) Calendered fabric

Fabric can be made by several processes, including spraying a coating like hypalon onto a base fabric. Calendering is a process used to coat a base fabric by passing the coating and base through rollers at high temperatures and pressures. The process integrates the coatings into the base fabric making a stronger bonded fabric.

(#k.) Lou Elliott

Lou had been using military surplus rafts on some of his smaller rivers: the 10-man assault bot with small sponsons, very flexible oval-shaped navy rescue rafts that had double tubes, and a 15' long 5' wide boat with an' inflatable floor. Lou's sons Rob and Jim and guides preferred the 10-man boat's shape but wanted it longer and wider. Since the mid-to late 1960s Avon had been manufacturing the Redstart, Redcrest (both still produced today) and the larger Redseal and Redshank as yacht tenders and sailboat dinghies. Lou had seen some of the Avons on Western Rivers and he contacted the company in 1960 or 1970 to build a model to his specifications and he sent them an army 10-man to modify and use as a pattern. By 1971 Avon began marketing Lou's whitewater boat as the 16' x 7' Avon Pro. Later Avon introduced the 14' Adventurer model for the growing private boater market. (40)

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